

USE OF CONJOINT ANALYSIS IN THE LIGHT OIL MARKET

Statement of the problem. The problem of studying the structure of consumer preferences is one of the urgent research tasks in marketing. There are many methods of research, but they only partially address the basic needs of customers motivational research. One of the best methods that would allow to combine the main advantages of the total number of investigated methods is a common method of analysis, which is based on a study of the domestic market of light oil.

Analysis of recent research and publications. An important contribution to the study of features of the collaborative analysis of market implementation of light oil made such domestic and foreign scientists: F. Kotler, Krykavskyy EV, Kuzmin, O., Zakharov TA [2] V. Kapustin, A. Schneider, A. Kryukov, Skybinskyy S., A. Starostin and others. In their writings considered characteristics of conducting market research on the retail market, the peculiarities of the formation of market demand for light oil, but not studied the problem of adaptation are specialized methods, which include the method of joint analysis on specific specific retail markets.

Problem. The aim of the paper is to study the characteristics of the collaborative analysis when conducting market research on the domestic retail market of light oil.

The main material of research. Joint analysis (CA) (conjoint analysis, from the English. Consider jointly) - a statistical method for analyzing the results of market research, which aims to determine the relationship of consumers to goods and services and identify those of them that influence consumer decision-making [1]. Its function CA refers to methods of identifying consumer preferences, in which the researcher can obtain numerically estimated model usefulness of the product in the eyes of consumers. CA not only allows you to make a "snapshot" of consumer preferences, but also continue to play the scenarios of the market situation by manipulating the received model. The method is universal : the utility model as its constituent parts may include virtually all marketing variables : technical characteristics and specification of goods / services, pricing and related features, terms of product promotion, etc. Along with the benefits that it provided a quick introduction, the CA is not without drawbacks, primarily due to the complexity of the data collection method (survey provides consumers). This led to the emergence of numerous species analysis (adaptive, hybrid, discrete choice, etc.), a review which did A. Cherenkov one of the first and perhaps the most famous publications on this topic [5]. A variety of known techniques, however, does not eliminate all the problems associated with conducting a joint analysis: the special difficulties exist for products that have a large set of features, as well as to market with many brands and high competition. It can be said that the joint analysis has long ceased to be "fashionable" in the domestic service market research, and is now the standard "range" of any big agency, adapting from time to time. You can not complain about the lack of domestic or foreign literature in CA : In addition to the above publications are several papers in periodicals, some textbooks contain chapters on this method [6] and universities, which included the study of CA in the curriculum for marketers develop their own educational materials. We set ourselves the task of comprehensively describe all known types of CA . We present a scheme of study, specific algorithms and examples related to their own practice of joint analysis. Since the actual research is inevitable deviations from strict procedures described in textbooks, we will try to show how woven into a general theory of situational analysis of the features of its application.

We start with the characteristics of the traditional scheme CA and touch on issues of importance to the consumer evaluation of individual properties (attributes) of goods and "utility" specific values of these properties, as well as options on prediction utility goods.

The idea of a joint analysis. The idea of the method clearly reflects the name : ConJoint (from Eng. CONsider JOINTly), which can be translated as "be considered together (collectively, simultaneously)". CA operates on the product model that contains a common set of its characteristics. Rating given to consumer goods in general, and then decomposed into implicit valuation attributed to individual customer specifications. In this sense, the method can be considered a joint analysis of decomposition. We expand its causes, pointing out some of the limitations of traditional compositional methods.

In the compositional approach each characteristic product / service (reliability, price, design) is estimated independently of the others, so that the evaluation of the product as a whole represented a weighted sum of independent evaluations of its performance. This method provides answers to many questions related to the peculiarities of individual parameters, but is unable to take into account the mutual influence of the various components of the product on the consumer adoption decision to purchase. Since the respondent to a direct question about the importance of these characteristics of the product tends to name all the important features offered. When shopping for consumer consumption may be an important fuel quality, environmental friendliness, ability to receive incentives from the loyalty program, and at the same time the impact of the fuel must be economically viable, such as fuel should be inexpensive. Many requirements thus mutually exclusive : a fuel with a high octane number and availability of expensive additives that make it economical, environmentally friendly can not be cheaper than comparable positions in the competition. Of course, a good gasoline can not be cheap. Only in the case where the producer can not find the optimal combination of price and options, fuel is "a hit."

The compositional method for assessing consumer preferences ignores recent willingness to compromise between different product characteristics as respondents easiest to attribute all the characteristics of high importance. And ask about preferences makes sense only in cases where there is no explicit vector advantages (price, quality). Recognizing these difficulties, researchers have sometimes forced the respondent to compromise by changing the shape of a question. You can distribute the 100 points of conventional significance between different characteristics of the goods. Then "add" the importance of any one characteristic can only be reducing the importance of others. But this approach does not always help the consumer to "open up" because he is in an atypical situation, because instead of valuation in general he offered to evaluate it in parts. Another disadvantage of these methods is the non-obviousness procedure of transition to monetary valuation of component product, however, as this information is important for further modeling. For example, ask the question: "To what threshold could raise the price of petrol with a lower octane before consumers switch to fuel with a higher octane?" You need to know which is the consumer compromise, preferring cheap fuel to the fuel with a higher octane number. Finally, the compositional approach to the evaluation of the benefits are difficult to disguise the purpose of the survey respondents that usually do not configure it to concentration and sincerity.

In contrast to compositional techniques during the CA respondents evaluate all features of the product in the complex. Variations that assess respondents called profiles. Profile is a product consisting of a set of levels of different attributes. Attribute - one of the characteristics of the product (color, price, shape, weight), the level attribute - one of its possible meanings.

This indirect method allows respondents do not think that 's important, but its advantages (the choice of the proposed set of profiles). [5] There is a simulation of the real situation of purchase. Numerical estimates of willingness to purchase, the consumer reflects on some scale, you can call the utility profile.

As evaluated several homogeneous profiles, their usefulness can be statistically decomposed into components of the utility level attributes (private utility, or part-worths). Technically it is procedures for regression analysis where the levels of attributes form a set of independent variables and the dependent variable serves utility profile as a whole. After each level attribute will get a rate that reflects its usefulness, the importance of the attribute as a whole is derived from a variation of the maximum total utility profile, which can be achieved by changing the attribute values (for example, adding or removing the amount of additives in the fuel).

Thus, once a respondent spent over -assessment profiles (in principle familiar to him as a customer), we obtain numerically estimated model to track the changing usefulness of the product in the eyes of consumers after changing its specifications. So it is possible to evaluate the attractiveness of any product in this category, including even non-existent, and eventually determine its potential market share (of course, subject to equality for all secondary factors considered structures that affect the purchase : The availability, accessibility trading point, etc.). Importantly, the model can be represented at different levels: the level of individual respondents / consumers, at different subgroups of consumers, as well as at the level of the sample ("market") in general. A set of simple additional techniques lets you use the resulting model to :

- prediction of usefulness of new structures (new versions of goods);
- forecast potential market share profiles;
- automatic classification of consumers into segments by the similarity of individual models of products (for example, under the cluster analysis);
- estimation of the elasticity of demand for the price.

This range of technical capabilities helps in solving a wide range of practical problems of marketing - related segmentation and forecasting market reviews on specific marketing solutions [5]. Practice has shown that CA is an effective tool for the analysis of current market conditions and forecast competitiveness of existing and new products in conditions of acute competition. Consider the example circuit of the study using a CA key and the nature of its results.

The general scheme and the main results of the joint analysis. This article is based on research-based scientists Karaev V.YU, Balabanov A. [3, 4] and E.Merder (Eric Marder) [8]. It adaptovuyuchy their research under the light oil market, we conducted a study in which 200 respondents were interviewed in Ternopil and Lviv. We will use the results of this study, on request by changing the structure of input data and semantic filling model.

Imagine a model of fuel that would satisfy the demands of consumers who use cars in the data sheet, which prescribed the recommended gasoline A-95 (Table 1), which consists of 5 attributes: octane (C level), environmental (compliance with Euro 4 Euro -5 [7]) (level 3) cleaning of fuel properties (presence of additives that result from constant use purified / reduce the negative impact of the fuel system of the vehicle) (level 2), manufacturer (level 4) thrift (the presence of additives that make it possible to travel longer distances for the same fuel expenses) (level 3), price (level 4). It should be noted that the price of goods in the model can be any, but the study selected a number of its key values. In this case, set to "10,99", "11,29", "11,99", "12,29"(UAH / l) - the first term - a minimum price of light oil market at the time of the study (May 2013), the last value - the maximum level of prices in the market at the same time (a reference to the price level).

Table 1

Model fuel as a set of attributes and levels

№	Attribute	Level 1	Level 2	Level 3	Level 4
1	The octane number	94	95	96	-
2	Environment	No compliance with Euro 4	Compliance with Euro 4	Compliance with Euro 5	-
3	Cleaning of fuel properties	Disposable cleaning properties of fuel	There are no cleaning properties of fuel	-	-
4	Manufacturer	Kremenchug refinery	ORLEN (Poland)	ROMPETROL (Romania)	MOZYR OIL REFINERY (Belarus)
5	Thrift	Available additives that increase with increasing consumption of fuel powered car	Available additives that reduce the consumption of fuel	There are no additives that affect the frugality of fuel	-
6	Price	10,99	11,29	11,99	12,29

Source: author's elaboration

A given set of attributes and their levels form the range of $3 \times 3 \times 2 \times 4 \times 3 \times 4 = 864$ different profiles (options consumption). This is a complete set of profiles, and since their number is large, respondents were almost impossible to evaluate the usefulness of all possible options. But usually score a full set of accounts is not required (in this example was used a reduced set of 16 sections). The minimum required number of profiles for the decomposition of the general advantages which indicates the consumer, to private utility is determined by the number of parameters to be estimated in the corresponding regression model.

During the evaluation of the benefits of private attribute levels in multiple regression models for each attribute level $k-1$ creating binary variables, to each of which provides for the existence of factor (multiplier setting) is a desired rating. Thus, in this case the number of parameters to be evaluated is $(3-1) + (3-1) + (2-1) + (4-1) + (3-1) + (4-1) + 1 = 15$. For ease of interpretation of the coefficients of a binary (0/1) coding is often replaced by an equivalent (in terms of the number of estimated parameters) contrast "deviations" (code level attributes so that the total utility, or, in this case the same as the average value of the attribute equal to zero). Then the utility of an individual (private utility) may be greater or less than zero. Note that the negative utility for some of the attribute does not mean "damage" of the option to the consumer, and, only less useful than is typical for the attribute as a whole. The usefulness of each level is measured independently of the other levels (but subject to the foregoing limitation on the total utility). Some attributes can be raised more stringent assumptions about the functional relationship attribute levels of utility goods.

For example, we can assume a linear utility function for when a price increase the profile of its usefulness (other replaceable parameters) decreases linearly. If the assumption of linearity turns out successful, we get at least two advantages over discrete utility function. First, the technical evaluation for prices utility can now be carried out only with two options prices (the other options available to profiles only make this assessment more accurate.) Second, as examining the benefits we gain coefficient of proportionality (slope), which when multiplied by the exact value prices give us an assessment of usefulness of this value. We get no discrete evaluation of different attribute levels, and the coefficient showing the "utility" of each additional hryvnia in the price of goods. Then the benefits of a new simulation profiles can be done not only with the values for which were incorporated in the model of the product, but potentially with any reasonable level of prices. The first evaluation model CA makes sense to evaluate all attributes with discrete utility function, and then consider whether the estimated useful numerical attributes be approximated by a linear (or what ever) function. If there is a good approximation of the model allows for a more subtle analysis than is available under the discrete model.

In this case, the price was selected linear utility function, which reduced the number of parameters needed to measure up to $(3-1) + (3-1) + (2-1) + (4-1) + (3-1) + 1 = 12$. Thus, we can restrict estimates of 12 profiles each respondent. This would assess their own private utility level attributes (or, in technical terms, their main effects) without assessing the effects of interactions (that is, without understanding, for example, specific utility simultaneous presence of additives that increase the ecological fuel (reducing sulfur content) and also inversely proportionately affect frugality fuel). The main effects are usually limited in most studies. But despite the sufficiency of 12 profiles, we have expanded their number to 16 to comply with orthogonal experiment plan - another technical recommendations. The statistical evaluation such "feature" is expressed or fundamental inability of the assessment, or a significant shift in relation to its true values. Orthogonal plan provides a reduced set of profiles in which all levels of the attribute levels are combined with other attributes in a constant proportion. However, adherence to such "independence" attribute is not always possible to achieve the minimum number of choices. In our case, an automatic procedure generating orthogonal plan proposed a set of 16 profiles. Each profile is described by a

reduced set of separate cards (Fig. 1). Cards are presented to respondents to assess their readiness to purchase the specified option on them fuels. Note that in a typical scheme of joint analysis of all respondents in the survey replicated the same set of profiles. In the example used a 9- point scale assessment profile (1 - just not buy, 9 - just buy).

Card №	
The octane number	95
Environment	Compliance with Euro 4
Cleaning of fuel properties	There are no cleaning properties of fuel
Manufacturer	ORLEN (Poland)
Thrift	There are no additives that affect the frugality of fuel
Price	12,29
Your rating (1-9) []	

Fig. 1. Sample card (profile) for a survey

Source: author's elaboration

Based on the collected data constructed linear regression models, which allow to evaluate the usefulness of levels of attributes : a) for each respondent separately, b) for sub-groups (segments) of consumers, c) for the entire sample as a whole. Constant regression model, along with the estimated useful things, meaning, usually does not carry, but necessary for calculations at the stage of modeling. Linear utility function chosen for the attribute "price" in the form of an assessment factor of proportionality (bts), which can be interpreted as the utility of each additional hryvnia prices. Discrete functions are used for the remaining attributes, normalized estimates as to the amount of benefits at all levels of the attribute to zero.

Table 2 shows the estimates of private benefits for some respondent i, and the calculation scheme and the magnitude of absolute and relative contributions of individual attributes in common utility. The relative contribution of the attribute is traditionally called its importance.

Table 2

Evaluation model of utility for the respondent and

Attribute	Level	The utility units.	Contribution, ed.	The relative contribution%
The octane number	94	-1,16	1,73	18
	95	0		
	96	1,16		
Environment	No compliance with Euro 4	-0,54	0,94	10
	Compliance with Euro 4	0		
	Compliance with Euro 5	0,54		
Cleaning of fuel properties	Disposable cleaning properties of fuel	0,68	1,13	11
	There are no cleaning properties of fuel	-0,68		
Manufacturer	Kremenchug refinery	-0,26	2,16	22
	ORLEN (Poland)	0,33		
	ROMPETROL (Romania)	0,14		
	MOZYR OIL REFINERY (Belarus)	-0,21		
Thrift	Available additives that increase with increasing consumption of fuel powered car	-0,17	1,38	14
	Available additives that reduce the consumption of fuel	0,17		
	There are no additives that affect the frugality of fuel	0		
Price	10,99	-0,98	2,45	25
	11,29	-1,34		
	11,99	-1,67		
	12,29	-2,56		
Constant		3,48		
The total contribution			9,79	100

Source: author's elaboration

Assessing the utility levels of all attributes, we can predict the usefulness of any profiles provided by the model. Table 3 shows the "worst" and "best" profile in terms of predictive utility. Greatest predictive utility to the consumer is the fuel of foreign production (ORLEN), with an octane number of 95, the additives that increase fuel frugality. Environmentally friendly fuel (compliance with Euro 4 and Euro -5), as well as

cleaning of fuel properties do not play a significant role. Clearly shows that the relative contribution (importance) attribute is the ratio scale (maximum minus minimum) utilities common to attribute the contribution of all attributes (or, equivalently, the difference between the predictive utilities of the "best" and "worst" profile). In other words, the importance of attribute - value is the maximum possible increase in utility "worst" profile by changing the levels of the attribute, expressed as a percentage of the maximum possible increase in the utility of the same profile by varying the levels of all attributes.

Table 3

The "ideal" model fuel for respondent i

The octane number	Profiles	
	worse	better
Cleaning of fuel properties	94	96
Manufacturer	No compliance with Euro 4	Compliance with Euro 5
Thrift	Disposable cleaning properties of fuel	There are no cleaning properties of fuel
Price	Kremenchug refinery	ORLEN (Poland)
The octane number	Available additives that increase with increasing consumption of fuel powered car	Available additives that reduce the consumption of fuel
Environment	12,29	10,99
Weather usefulness	-5,37	1,9

Source: author's elaboration

It is obvious that, following the same pattern prediction calculation can predict not only the utility of a hypothetical "worst" or "best" product for the respondent, but the usefulness of a particular type of fuel available on the market, or is preparing to leave for him. Here are a few restrictions : Do not go 1) beyond common sense and 2) for the model (Table 1), which is the basis of the calculated parameters.

Tables similar to Tables 2 and 3, we can construct and individual customer groups (subgroups of respondents), and the sample as a whole. Of course, the total numerical estimates may differ significantly from the scores of individual respondents. Individual utility model is usually used in the calculation of market shares (of the forecast) for the real-world commodity and new models, as well as market segmentation based on consumer preferences. Generalized same performance characteristics are intended for general "relationship market" (or segments) to product variations.

Findings from this study. In this article the general characteristic common purpose of analysis, collection procedures and data analysis, practical examples of defined structure and scheme of interpretation of the main results. At this stage it is already possible to judge the impact of the relationship between attributes in choice of product, as well as the nature and strength of influence of each attribute for aggregate utility of the product. These data are known to us at the level of individual respondents and the level of subgroups or the entire sample. Direct the development of this knowledge is to predict the usefulness of profiles that were not represented in the survey, but are placed in the original model. Yes, it is possible to assess which of the two competing models will have greater predictive utility to the market as a whole or its individual parts.

However, joint analysis does not end there. Efficiency obtained in the survey data is now entirely the responsibility of the analyst. Depending on the purpose of the study, it may propose to estimate market shares who hold (or can take) existing (new) versions of products, to assess the revaluation of shares that may result from bringing to market a new product or company competitors. Individual examining the benefits in terms of statistical methods are a set of new variables on which possible further processing results. Cluster analysis conducted on these estimates, can offer options for segmentation based on homogeneity in consumer preferences. Evaluation of the usefulness of the forecast change in price changes will give an idea of the price elasticity of demand.

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Ratynskiy V. USE OF CONJOINT ANALYSIS IN THE LIGHT OIL MARKET

Purpose. The purpose of the article is to substantiate the characteristics of the collaborative analysis when conducting market research on the domestic retail market of light oil.

Methodology of research. Attraction marketing tools to all areas of economic life makes theoretical and practical interest in planning algorithms in various areas of marketing. The priorities among these scheduling algorithms will surely be based development activities in marketing research. The article deals with peculiarities of using a conjoint analysis in the light oil market, analyzes a number of factors influencing a retail price on the competitive light oil market, and defines main factors in choosing a price policy by filling station networks at the stage of developing company's strategy. Methodological basis of market research consist of general scientific methods, namely, systems analysis, an integrated approach, program and target planning and analytical and prognostic methods.

Different methods and data collection algorithms: a survey, observation, and various methods of processing and analyzing data were used to collect the information. Method of consumer survey was conducted to identify their intentions to demand for goods. Data collection was carried out by various methods: filling out the application forms or letters survey respondents during the interviews face-to-face or by telephone. In processing the data the method of summation of group responses and establishing their interest for choice answers.

Findings. Based on the survey was developed and elaborated algorithm of marketing research for the method of joint analysis of the market of light oil.

Peculiarities of using of joint analysis on the market of light petroleum products have been considered. A number of factors influencing on the retail price on the market of light petroleum products in a competitive environment has been analyzed. The main factors in choosing the pricing policy by networks of filling stations at the stage of formation of strategy of the enterprise have been defined.

The strengths and weaknesses sides in choosing the level of prices of fuel, which is offered to potential buyers has been allocated, prospects of its change on the basis of conjoint-analysis have been analyzed. Hidden potential of using certain types of analysis during the marketing research has been indicated.

Originality. Scientific novelty is to identify the characteristics of marketing research using the joint analysis of the market of light oil.

The practical value is to conduct the algorithm of market research on light oil market and obtaining concrete results - the needs and wishes of potential customers for individual fuels. Given the major global dynamics of increased competition on the market of sale of light oil problem using statistical methods during the marketing research is becoming more acute.

Keywords: conjoint analysis, price, fuel, purchases, light oil, fuel quality.